CLAIMS

1. A sensor array for detecting an analyte in a fluid, said sensor array comprising at least two different types of sensor elements, one sensor element having a sensor region responsive to said analyte by a change in volume and the other element having a sensor region responsive to said analyte by a change in mass, whereby the responses of said at least two sensor elements are combined to provide an output characteristic of the molecular density of the analyte.

2. The sensor array of claim 1 wherein the volume-changing sensor is comprised of a composite material containing a polymeric matrix with electrically conducting regions of a second material, whereby the electrical properties of the composite material change with a change in volume as a result of absorption of the analyte to be detected.

3. The sensor array of claim 2 wherein the polymeric matrix of the composite material is organic.

4. The sensor array of claim 2 wherein the polymeric matrix of the composite material is inorganic.

5. The sensor array of any one of claims 2 to 4 wherein the change in electrical properties of the composite material is a change in the resistance or charge capacitance of said composite material.

6. The sensor array of any one of claims 2 to 5 wherein the volume-changing sensor includes electrically conductive and non-conductive regions.

7. The sensor array of any preceding claim wherein the volume-changing sensor is a carbon black doped chemoresistor.

8. The sensor array of any one of claims 2 to 6 wherein the polymer of the volume-changing-sensor is loaded with either silver/gold/other metallic colloid or cluster, a conducting polymer or a redox metal or organometallic complex.

9. The sensor array of any preceding claim wherein the volume-changing sensor comprises interdigitated electrodes.

10. The sensor array of any preceding claim wherein the volume-changing sensor is a capacitance/complex impedance sensor.

11. The sensor array of any one of claims 1 to 9 wherein the volume-changing sensor utilises an optical, thickness-sensitive technique such as surface plasmon resonance spectroscopy or ellipsometry or based on an optical transmission through a coated fibre optic.

12. The sensor array of any preceding claim wherein the mass-changing sensor comprises an acoustic resonance device.

13. The sensor array of claim 12 wherein the mass-changing sensor and the volume-changing sensor are coated with a polymer coating.

14. The sensor array of any of claims 12 or 13 wherein the resonance device is loaded with a semiconductor component.

15. The sensor array of any of claims 12 to 14 wherein the acoustic resonance device is a quartz crystal microbalance.

16. The sensor array of any of claims 12 to 14 wherein the acoustic resonance is generated by a surface acoustic wave device.

17. The sensor array of any preceding claim wherein the volume-changing sensor and mass-changing sensor are integrated on the same device or sensor structure.

18. The sensor array of claim 17 wherein the volume-changing sensor and mass sensors are coated with a perm-selective coating.

19. A system for detecting an analyte in a fluid, said system comprising an array of analyte sensors, each sensor on said array having at least two different sensor elements, whereby upon adsorption of said analyte, a sensing region of a first sensor-element responds to

said analyte by a change in volume, and a sensing region of a second sensor element responds to said analyte by a change in mass, the combined response of the two sensor elements being characteristic of the molecular density of the analyte being detected; and an electrical measuring device electrically connected to said sensor array for detecting the outputs of the sensors of said sensor array and processing means for processing the output of said sensors to provide an output signal indicators of the analyte in the fluid to be detected.

20. A method of detecting an analyte in a fluid, said method comprising the steps of passing the analyte to a first sensing element providing a first output signal for said first sensing element in response to a volume-change caused by adsorption of said analyte by said first sensing element,

passing the analyte to a second sensing element and providing a second output signal for said second sensing element in response to a mass change cause by adsorption if said analyte by said second sensing element, and

combining the first and second output signal to provide a signal characteristic of the molecular density of the analytes being detected.

21. The method of claim 20 further including the step of processing a plurality of first and second output signals from said sensors.

22. The method of claim 21 wherein the signals are processed serially.

23. The method of claim 21 wherein the signals are processed in parallel.